ABSTRACT

DEVICE PROVIDING PICTURE VISIBILITY FROM ALL SIDES

The invention refers to a device which provides picture of the object visibility from all sides, whereby the object exposed to view can be in the form of an inscription or picture or three-dimensional object or running inscription or mobile picture etc. The construction of the device depends on the purpose of use. The picture is the same for all viewers standing around the device and it is presented as a high-frequency and/or true picture. The device further allows for viewing of different pictures depending on the viewer's position around the device. The invention belongs to class G 09 F 11/02 of the international patent classification.

The technical problem successfully solved by the device in question involves the design and construction of such device which enables high-frequency and/or actual presentation of identical information in any form (inscription, picture, three-dimensional object, running inscription, mobile picture, mobile object etc.) from any position on the horizontal level around the device and/or provides high-frequency, actual display of different information in whatever form in different positions on the horizontal level around the device.

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The existing information media, such as advertising panels, illuminated inscriptions on walls and high buildings, LED and LCD displays and TV screens are not visible from all sides but only from a single direction from a specific viewing angle.

The information media which are exposed to several sides, e.g. four-panel boards, are visible from all sides, but the viewer can also see the adjacent information medium, whereas the information is seen from the right angle from certain positions only.

The information media which turn around a vertical axle, e.g. two-panel, three-panel revolving boards, are visible from all sides, but the information is not simultaneously visible from all sides.

As a matter of fact, the device providing picture visibility from all sides, such as referred to in this invention, is a fast rotating opaque cylinder discontinued lengthwise by a transparent slot, whereby the cylinder rotates at high angular velocity around its axle together with the object. The transparent slot is positioned in front of the object. Depending on the type of the viewed object (two-dimensional object, three-dimensional object), the latter shall be of appropriate design, so that the picture of the object is visible in the desired form.

The device providing picture visibility from all sides, as referred to in this invention, will be explained in detail on the basis of the example and the pictures, whereof

Figure 1 shows the device referred to in this invention, which provides visibility of the identical pictures of the object from all sides, as partial section and as side view;

Figure 2 shows the device referred to in this invention, which provides visibility of the identical pictures of the object from all sides, as sections A-A and B-B;

Figure 3 shows the diagram of the device referred to in this invention, providing picture visibility of viewed objects in the form of inscription and three-dimensional object, as partial section and side view as well as the respective ground plan;

Figure 4 shows the diagram of the device which provides visibility of the different pictures of the object from different viewing directions, as a ground plan and with reference to display brightness in positions $\alpha 1$, $\alpha 2$, $\alpha 3$ ... αn;

Figure 5 shows an example of the $\beta 1$, $\beta 2$, $\beta 3$... βn viewing angle range, whereby the viewer can see a different picture of the object at every viewing angle.

The device providing picture visibility of an object and/or of several objects from all sides and whereof the basic design is shown in Figure 3 allows for viewing of a three-dimensional object 3a (static and mobile three-dimensional object) and of a two-dimensional object 3b (inscriptions, pictures, mobile pictures, running inscription) from all sides, with high frequency, identically to all viewers around the device, whenever an opaque cylinder 1 with the object 3 rotates at high angular velocity around its axle; the transparent slot 2 lengthwise discontinuing the opaque cylinder 1 is always located in front of the object 3. The opaque cylinder 1 may be a dark and non-shiny tube with a cut-out slot 2 or a colourless transparent tube covered with a dark, opaque and non-shiny layer discontinued for the width of the transparent slot 2, or an opaque cylinder 1 discontinued by a transparent slot 2 which during the operation constantly interrupts the opaque cylinder in the way that it is constantly in front of the object 3. Such three-dimensional object 3a as well as the two-dimensional object 3b shall be appropriately shaped. The two-dimensional object 3b, if inscription or picture, must be curved to give a straight picture provided by the device. The three-dimensional object 3b must be deformed to give the desired object picture provided by the device. The curved shape and/or the deformation of the viewed object 3 depends on the distance of the object 3 from the slot 2 as well as on the purpose of the device. With the device in question, designed for remote viewing, the

objects 3 are strongly deformed, but with devices designed for viewing at short distances the objects 3 are less deformed.

The width of the slot 2 influences the quality of the picture of the object 3. With a narrow slot 2 the picture of the object 3 is sharp enough, but less bright. With a wide slot 2 the situation is, however, just the opposite.

To provide a high frequency (not blinking) picture of the object it is necessary to increase the frequency of the device itself, which can be achieved by increasing the number of revolutions or by increasing the number of transparent slots and identical objects 3.

The objects 3 under observation may be real objects (a two-dimensional inscription 3b fixed to the structure; a three-dimensional object 3a fixed to the structure of the device) or apparent objects (object 3 as a holographic projection; object 3 is apparent, its visibility can be achieved on the optical level, with mirrors, prisms, lenses etc.).

The objects 3 under observation shall be bright enough. They may be well illuminated or they radiate light themselves. The brightness of objects 3 shall be a high-frequency one or constant on a micro time interval.

Figures 1 and 2 show an example of the structure of the device referred to in this invention, which consists of a fast rotating rotor, a driving unit, an electric system which enables transmission of electric current to the rotor and to the housing of the device.

The rotor consists of a dark non-shiny tube with three transparent slots 2, three curved two-dimensional objects 3 with inscription, cover 10 and

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11, slip rings and wires for electric current transmission to light sources 7, which makes the electric system 13 in the rotor, bearing 14, lamellas 6 and light sources 7.

The rotor is assembled in the way that the tube 1 and the two-dimensional objects 3 fit tightly into the grooves of the covers 10 and 11. The slip rings of the electric system 13, the lamellas 6 and the light sources 7 are fixed to the rotor structure, whereas the bearings 14 are pressed into the covers 10 and 11. The transparent slots 2 are positioned in front of the objects 3.

The rotor rotates on the axle 4 on bearings 14 and is axially blocked with a axial clamp ring 15. The rotor is driven via the shaft 5 by the electromotor 12. The shaft 5 is fixed by screw to the cover 11, whereas on the shaft of the electromotor 12 it is protected against distortion with a wedge.

The plate 16 is fixed by screw to the base 19. The electromotor 12, the axle 4 and the brushes of the electric system 13 are fixed by screw to the plate 16.

The protective external transparent tube 17 is mounted and fixed by screw to the housing 19 and cover 18.

The dark non-shiny tube 1 may be provided with cut-out slots 2 or the transparent tube is covered with a dark, opaque, non-shiny layer, discontinued for the width of the transparent slot 2.

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The width of the slot 2 influences the quality of the picture of the object 3. If the slot 2 is narrow, the picture of the object is sharp enough, but its brightness is worse. With a wide slot 2 the situation is just the opposite.

The two-dimensional object 3 is illuminated by light sources 7. The illumination of the object 3 may be increased by application of an internal chrome coating of the tube 1, which provides less heating of the tube 1 due to light sources 7.

Internal cooling of the device referred to in this invention, which is heated by the light sources 7, is achieved with objects 3, with boreholes 8 on the lower cover 10 and with boreholes 9 on the upper cover 11. The boreholes 8 are located at a different distance from the rotor axle than the boreholes 9.

The width of the visible part of the picture of the viewed object 3 is limited with lamellas 6.

To provide a high frequency (not blinking) picture of the inscription on the object 3, the device shall operate at sufficient frequency. In the case explained this can be achieved with three transparent slots 2, with three two-dimensional objects 3 and with a sufficiently high number of revolutions of the electromotor 12.

The transmission of electric current to the rotating part of the device is effected through the electric system 13, which consists of brushes, electric installation and slip rings.

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The safety of the device can be achieved with a safety transparent tube 17.

Figure 4 shows the diagram of the device which allows for high-frequency display of different pictures of object viewed by viewers standing around the device. Such pictures of the objects 3 are different, depending on the viewers' positions around the device. Object 3 is the electronic display.

The electronics of the displayed object 3 - the electronic display shall operate in the way that at the angle $\alpha 1$ the first column of the display S1 lights up, at the angle $\alpha 2$ the second column of the display S2 lights up, at the angle $\alpha 3$ the third column of the display S3 lights up, at the angle αn ... the nth column of the display Sn lights up. Then the display is visible only in one direction and the column shall be lit for a certain time interval only. The cycle of consecutive lighting up of the first, the second ... the nth column makes up the desired picture of the object which the viewer can see as a true, non-blinking picture.

The time interval of column brightness determines the viewing angle β under which the picture of the object is still visible with reference to the original direction.

The angle β may be of different size, yet within such limits that the display can be visible as whole. By changing the viewing distance R, the viewed picture of the display becomes curved, which results in visibility of only a certain width of the display picture. The above problems can be

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avoided with a sufficient angle β and a display depending on the viewing distance, whereof the consequence is a limited number of different display pictures exposed to viewing.

At viewing beyond the angle β, the viewer can see a new display picture. Figure 5 shows the viewing angle ranges β1, β2, β3, ... βn, in which the viewer can see the picture of the object 3 which may be different from every viewing angle.

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